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PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING

MAKE UP EXAMINATION – JAN 2023

Course Code: ECE 297

Course Name: INTERNET OF THINGS

Program : B.Tech

Date: 27-JAN-2023

Time: 09:30AM-12:30PM

Max Marks: 100

Weightage: 50%

Instructions:

Read all questions carefully and answer accordingly.

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries 2 marks. (15Qx 2M= 30M)

1. Open-source hardware and software platform that is easy to use. _____ are capable of reading analog or digital input signals from various sensors. (C.O.No.2) [Knowledge level]

2. The primary motivation of AMBA protocols is to have a standard and efficient way of interconnecting the functional blocks and peripherals with re-use across multiple designs. List any four AMBA standards. (C.O.No.2) [Knowledge level]

3. A standard interface for connecting a single-board computer or microprocessor to other devices is through General-Purpose Input/ Output (GPIO) pins. How many pins are used as digital input pins in Arduino? (C.O.No.2) [Knowledge level]

4. The LAN, WAN, PAN are type of network which connects objects with each other. The latest network of interconnected heterogeneous objects such as smart devices, smart objects, sensors, actuators, embedded computers, etc. uniquely addressable and based on standard communication protocols. Write the name of this network and list its components. (C.O.No.2) [Knowledge level]

5. The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. Mention the two functions present in IDE. (C.O.No.2) [Knowledge level]

6. To write a code we need to plug Arduino with the help of a USB Cable and then we need to identify the port at which the board is visible. Write the interfacing steps required to do the job. (C.O.No.2) [Knowledge level]

7. Each device on the network is assigned a unique identity known as IP(Internet Protocol) address.

A) IPV4 and IPV6
B) Difference between IPV4 and IPV6 (C.O.No.2) [Knowledge level]

8. The architecture of IoT depends upon its functionality and implementation in different sectors. Still, there is a basic process flow based on which IoT is built. _____ Lowest layer in the IoT architecture.

(C.O.No.1)[Comprehension Level]

9. Wearable technologies, known mostly just as “wearables,” these are electronic devices that are physically worn by individuals in order to track, analyze and transmit personal data. List the architectural elements of Wearable IoT. (C.O.No.3) [Knowledge level]

10. Near Field Communication (NFC) technology allows users to make secure transactions, exchange digital content, and connect electronic devices with a touch. Mention the two modes of communication in it.

(C.O.No.3) [Knowledge level]

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11. In RFID, the data can be read from a distance with no contact or even line of sight necessary. How these RFID can be used in the field of IoT. (C.O.No.3) [Knowledge level]

12. Cloud computing refers to storing and accessing the data and programs on remote servers that are hosted on the internet instead of the computer’s hard drive or local server. Mention the three of the main branches of cloud computing. (C.O.No.3) [Knowledge level]

13. WIoT is new branch of internet of things and wearable Computer is a small portable computer that is designed to be worn on the body during use. List two wearable devices. (C.O.No.3) [Knowledge level]

14 The LAN, WAN, PAN are type of network which connects objects with each other. The---------- is the network of interconnected heterogeneous objects such as smart devices, smart objects, sensors, actuators, embedded computers, etc. uniquely addressable and based on standard communication protocols.

(C.O.No.1) [Knowledge level]

15 A sensor node is a type of transducer that uses one type of energy, a signal of some sort, and converts it into a readable value for the purpose of information transfer. Mention the components of sensor nodes.

(C.O.No.1) [Knowledge level]

Part B [Thought Provoking Questions]

Answer all the Questions. Each question carries 10 marks. (3Qx10M=30M)

16 A smart “Digital Camera Pen Recorder” is used for recording pictures (or videos) unobtrusively in situations like spying, meetings, taking lecture notes etc. The images or videos could be stored locally as well as they could be transmitted to cloud via a gateway. The central command (assume a military scenario, although debatable) may use the information for identification of the speaker’s location, meeting scenarios and instruct the wearer for further necessary activities to be performed maybe on his/her mobile. Your task is to map the activities of all the processes for this system, that will be taken care at all the levels of The IoT World Forum (IoTWF) Standardized Architecture (C.O.No.2) [Comprehension level]

17. Cloud is a utility which has helped the organization to reduce or eliminate their reliance on on-premises server, storage, and networking infrastructure. (C.O.No(2) [Comprehension level]

A. What are the cloud components?
B. What are the benefits of cloud architecture?
C. Describe three models presently used in IoT cloud?
D. How cloud Architecture Works?

18 The Bruhat Bengaluru Mahanagara Palike (BBMP) has a plan to install NB-IoT enabled Smart Parking and Lighting System in Bangalore due to limited parking spaces in certain key areas. The NarrowBand-

Internet of Things (NB-IoT) is a standards-based low power wide area (LPWA) technology developed to enable a wide range of new IoT devices and services. Some of the important features of NB-IoT: improves the power consumption of user devices, battery life of more than 10 years can be supported, can co-exist with 2G, 3G, and 4G mobile networks, all the security and privacy features of mobile networks supported such as user identity confidentiality, entity authentication, confidentiality, data integrity, and mobile equipment identification.

BBMP will install sensors embedded into the street under the parking spaces which can sense when a space is free or empty by the presence of a vehicle above them. This status is then communicated through a Network Operator's NB-IoT radio access network which is linked to a Telecom network. The parking data are then collected by a local partner of the Network Operator (in turn connected to cloud), who provide a parking app that residents can use to view where there are parking spaces available. The app is then able to guide the driver direct to the available parking spot.

Your task is to map the activities of all the processes for this system, that will be taken care at all the levels of The IoT World Forum (IoTWF) Standardized Architecture. You can present your solution using a table by showing the activities and applicable resources.

Part C [Problem Solving Questions]

Answer all the Questions. Each question carries 8 marks. (2Qx20M=40M)

19 Consider the scenario of a Smart Office Building situated in Delhi. On a humid evening after the normal working hours (6 PM), when all employees had left the office, the Manager gets a call (at 7.30PM IST) from an international collaborator in USA, that he needs to meet at least the manager himself and three of his subordinates in the boardroom of the office in Delhi. The manager informs immediately all three subordinates that they should reach before 8PM (all including the manger leave in nearby areas). Considering the smart connected building concepts, identify and list out at least four important activities that will be performed by various smart sensors and actuators till the meeting gets over in 2 hrs. (Please write you answer in minimum four bulleted points) (C.O.No.3) [Comprehension level]

20. India's smart city program hopes to revolutionize city life and improve the quality of life for India's urban population. In the absence of a zonal plan, many parts of Dehradun have witnessed haphazard development over the years, which has already caused much damage to the vision of a planned smart city. Smart City would require smart economy, bright people, smart organization, smart communication, smart engineering, smart transit, fresh environment and bright living. Nevertheless, with mass migration leading to basic problems, like water shortages and overcrowding, the rate at which these cities will be developed will be the key. Several initiatives are being led by the Government of India to convert 100 Cities into Smart Cities.

List and illustrate various design challenges faced to promote the sustainable development of urban development of the cities (C.O.No. 2) [Application level]